

1     Method of Making a Line

2

3     The present invention relates to a method of making  
4     lines on ground surfaces suitable for playing fields  
5     and the like, and apparatus and material therefor.

6

7     In the island of Ireland, there are approximately  
8     120,000 playing pitches for soccer, gaelic football,  
9     cricket and the like. The lines for such pitches are  
10    generally formed by a wheeled paint buggy, which  
11    introduces a line of paint on the ground through the  
12    travel of the front wheel through a paint reservoir.

13

14    However, heavily used pitches often require newly  
15    painted lines every week during a playing season,  
16    whereas these lines are often 'lost' in the non-  
17    playing season as the surrounding grass encroaches,  
18    and the pitches are not so regularly mowed. Weed or  
19    grass killer can be added to the intended line, but  
20    because grass is on either side of each line, the  
21    grass and weeds still encroach quickly. It will be  
22    appreciated the amount of time taken by groundsmen

1 to keep clearing and repainting pitch lines for  
2 120,000 pitches in Ireland alone.

3

4 It is an object of the present invention to provide  
5 more permanent lines in the ground.

6

7 Thus, according to one aspect of the present  
8 invention, there is provided a method of forming a  
9 line on a ground surface comprising the steps of:  
10 forming one or more slits in the ground surface;  
11 inserting a line of material in the or each slit  
12 such that part of the material is visible above the  
13 ground surface.

14

15 The slit in the ground surface could be formed by  
16 any suitable means, one such being a blade,  
17 preferably cylindrical, and preferably having a  
18 sharpened or tapered edge to assist entry into and  
19 through the ground surface.

20

21 The ground surface can be any surface on which a  
22 slit can be formed, one such being earth, more  
23 generally grassed earth.

24

25 In one embodiment of the present invention, the  
26 method comprises forming between two and four slits,  
27 preferably three slits, parallel in the ground, so  
28 as to create a broader form of 'marked' line. Where  
29 the method involves forming multiple lines, the  
30 lines can be any suitable distance apart. Where it  
31 is intended generally to provide a single visible  
32 marked line in the ground surface, the multiple

1     slits are preferably relatively close, generally  
2     within 10-40mm, and such as 20mm, inter-distant.

3

4     The or each slit created preferably creates little  
5     or no visible disturbance on the ground surface  
6     other than the marked line. Preferably, the ground  
7     surface is rolled after the insertion of the or each  
8     line of material.

9

10    The material may be any suitable material, at least  
11    part of which is visible above the ground surface.

12    The material may be any suitable colour, white being  
13    the commonest colour for many playing pitches. More  
14    than one colour could also be used, in any design or  
15    pattern.

16

17    Preferably, at least that part of the material  
18    visible above the ground surface is partially or at  
19    least substantially resistant to sunlight, in  
20    particular UV light. In this regard, the material  
21    may inherently have a high kilo-langley strength, or  
22    be treated so as to have such a high strength.

23

24    In another embodiment of the present invention, the  
25    material is at least partly open or has an open  
26    structure, through which the ground under the ground  
27    surface, or anything growing in the ground under the  
28    ground surface, such as the roots of grass, etc, can  
29    extend so as to help anchor the material in the slit  
30    either immediately and/or over time.

31

1 According to another embodiment of the present  
2 invention, the material is a polymer material such  
3 as polypropylene. Such material is widely  
4 available.

5  
6 One range of polypropylene textile fibre materials  
7 are geotextiles. Such materials have moisture  
8 resistance so that water has no effect on tensile  
9 strength or mechanical properties, extensive  
10 chemical resistance, leachate compatibility,  
11 biological resistance as polypropylene does not  
12 support fungal growth, temperature stability,  
13 ultraviolet resistance (preferably by the addition  
14 of carbon black or other UV inhibitors), and  
15 superior puncture and Mullen burst strength (which  
16 make them resistant to installation stresses). One  
17 supplier of such materials is Don and Low Limited,  
18 Forfar, Scotland.

19  
20 The material is preferably inserted in the slit by  
21 travel on the slit-forming means. More preferably,  
22 the material travels on the edge of the slit-forming  
23 means towards and into the surface, and is located  
24 in the slit as the slit is being formed.

25  
26 More preferably, at least a portion of the material  
27 which is not inserted into the ground surface  
28 comprises a number of separate or discrete fibres,  
29 or fibre-like extensions. These together provide  
30 the visual form of the line, but are wholly or  
31 substantially individual like blades of grass. More  
32 preferably, that portion of the material above the

1 ground surface is not damageable by a lawnmower or  
2 ground trimmer or the like.

3

4 The material could also include a herbicide, such as  
5 a weedkiller or the like, which preferably leaches  
6 from the material over time, and helps keep the area  
7 in and around the ground surface relatively clear.  
8 This includes grass.

9

10 According to one embodiment of the present  
11 invention, the material comprises a woven plastics  
12 material, having a central woven portion which is  
13 insertable in the ground surface, and extended weft  
14 fibres adapted to partially or substantially  
15 extended above the ground surface.

16

17 Thus, according to one embodiment of the present  
18 invention, there is provided a method of forming a  
19 line on a ground surface comprising the steps of:  
20 locating a slit-forming means having at least one  
21 blade on the ground surface, such that a portion of  
22 the blade enters the ground surface;  
23 locating a fibrous or woven material on each blade;  
24 traversing the slit forming means along the path of  
25 the intended line;  
26 allowing the material to travel with each blade into  
27 the ground;  
28 leaving the material in each slit formed such that  
29 part of the material is visible above the ground  
30 surface.

31

1 According to a further embodiment of the present  
2 invention, the line formed by the present invention  
3 is 'permanent', i.e. remains to form a line for at  
4 least a number of years, expectantly greater than  
5 ten years.

6  
7 The height of the material above the ground can be  
8 any suitable height, possibly based on expectation  
9 of use. For example, 30-35mm height is generally  
10 suitable for many football pitches. Also, some  
11 ground surfaces are not flat, and the height of the  
12 visible material may be such as to be able to  
13 accommodate variation in the level of the surface.

14  
15 In a second aspect, the present invention extends to  
16 a line on a ground surface formed by the method  
17 and/or material as hereinbefore described.

18  
19 The method, and line thereby formed, may be straight  
20 or arcuate or any combination. The path of the line  
21 may follow guide means on the surface, or other  
22 markings.

23  
24 When a straight line is desired, a direction means  
25 may be used, such a light beam, for example a laser  
26 beam. The beam could be directed along the intended  
27 path of the line, and that path then followed.

28  
29 Thus, according to another embodiment of the present  
30 invention, the method further includes the step of  
31 following a light beam along the path of the  
32 intended line.

1

2 According to a third aspect of the present  
3 invention, there is provided a line-forming  
4 apparatus, which apparatus comprises one or more  
5 rotatable blades, each blade being adapted to form a  
6 slit in the ground surface, and adapted to feed  
7 around its edge a material for partially inserting  
8 into the slit.

9

10 Preferably the apparatus includes a roller following  
11 the or each blade, more preferably two or more  
12 rollers on which the apparatus traverses along the  
13 ground surface.

14

15 The apparatus could also include a line-direction  
16 means, or line-direction means receptor, such as a  
17 laser beam, or a laser beam screen. The user of the  
18 apparatus then follows the path of the beam to  
19 create a straight line.

20

21 According to a fourth aspect of the present  
22 invention, there is provided use of a material as  
23 hereinbefore defined to make a line on a ground  
24 surface.

25

26 The material could be made from any material  
27 including plastics. Preferably the material is a  
28 polyolefin such as polypropylene or a co-polymer,  
29 more preferably a geotextile.

30

31 According to a fifth aspect of the present  
32 invention, there is provided a vented fabric

1 material suitable for use in forming a line on a  
2 ground surface.

3

4 Preferably, the vented fabric material comprises  
5 warp and weft fibres, having a core section or solid  
6 centre line, and free weft fibres or tapes on each  
7 side. The free weft fibres are designed to be that  
8 part of the fabric material that partially or  
9 substantially extends above the ground surface.

10

11 The material is preferably a woven plain material,  
12 more preferably a non-fibrolated tape. Typical but  
13 not-limiting qualities include 97 and 47 warp and  
14 weft ends per 10cm, 125g/m<sup>2</sup> density, and 50 tex  
15 striped warp, and 220 tex white UV weft fibres.

16

17 The vented fabric material could be formed from a  
18 fully woven material, from which warp fibres are  
19 removed from each side to provide 'free' portions of  
20 the weft fibres.

21

22 Alternatively, and according to another aspect of  
23 the present invention, there is provided a process  
24 for forming a vented fabric material as herein  
25 before described, wherein lines of weft material are  
26 run, and intermittent lines of warp fibres are run  
27 thereinbetween, so as to form portions of woven  
28 material and portions of weft fibre material only.

29

30 Such a material can then be cut across each weft  
31 fibre portion, to create a vented fabric material



1     having a woven core portion, and free weft fibres on  
2     each side.

3

4     Preferably, there is a catch thread included which  
5     holds the warp threads in place.

6

7     The process provides periodic weaving, or non-  
8     weaving, periods.

9

10    Embodiments of the present invention will now be  
11    described by way of example only, and with reference  
12    to the accompanying drawings in which:

13

14    Figure 1 shows marked lines in a grassy earth  
15    surface according to one embodiment of the present  
16    invention;

17    Figures 2a and 2b are diagrammatic cross-sections of  
18    the ground in Figure 1 along Arrows A & B  
19    respectively;

20    Figure 3 is a side view of apparatus according to  
21    another embodiment of the present invention;

22    Figure 4 is an enlarged part view of part of the  
23    apparatus in Figure 3 in use;

24    Figure 5 is a plan view of the apparatus in Figure  
25    3.

26    Figure 6 is a schematic plan view of a vented fabric  
27    method of production according to another embodiment  
28    of the present invention; and

29    Figure 7 is a section of vented fabric prepared from  
30    the process of Figure 6.

31

1 Referring to the drawings, Figure 1 shows marked  
2 lines 2 in a grassy earth-surface 4 as an  
3 illustration of the effect of the present invention.  
4 The marked lines could be used as pitch lines for  
5 the corner of a soccer or gaelic football pitch.

6  
7 Figure 2a shows a cross-sectional view through the  
8 ground 4 across the path of the marked line 2 in  
9 Figure 1, showing the location of three lines of  
10 white material 6 in the ground surface 4. Figure 2b  
11 shows a longitudinal cross-section of the marked  
12 line 2 of Figure 1 along Arrow B. These figures  
13 show the material 6 having a woven section 10 which  
14 is within the ground surface 4, and the free fibres  
15 12 extending therefrom, the ends of which 19 are  
16 visible above the ground surface 4.

17  
18 That part of the material above the ground surface 4  
19 is labelled in Figures 2a and 2b as 20, and that  
20 part which is below the ground surface 4 is labelled  
21 22.

22  
23 In Figure 2a, figurative grass 8 is shown each side  
24 of the line 2, although the relative heights of the  
25 grass 8 and the parts of the material above the  
26 ground surface 20 are for illustrative purposes  
27 only.

28  
29 It is expected that the grass 8 will re-grow around  
30 the visible part 20 of the material. However,  
31 material such as polypropylene is not cuttable by  
32 most if not all types of lawnmowers, especially

1 those lawnmowers used generally to mow playing  
2 surfaces. Thus, it is not a problem if the grass  
3 grows in amongst the visible material 20 creating  
4 the marked white lines, as mowing of the surface  
5 will reduce it to the same or a lower height than  
6 the visible (but free) polypropylene fibres 12,  
7 maintaining the visibility of the overall white line  
8 2.

9  
10 Figure 3 shows apparatus comprising three cutting  
11 discs or blades 30. The blades 30 are rotatable  
12 about separate axles 32. The axles 32 are parallel  
13 and offset as shown in Figure 5. The interdistance  
14 of the blades 30 could be approximately 20mm apart,  
15 which distance is adjustable.

16  
17 The three blades 30 are generally housed within a  
18 ballast frame 34. At the forward and rear ends of  
19 the frame 34 are round surface rollers 36. Above  
20 each blade 30 is a spool carrier 38, each having a  
21 spool tensioner 44.

22  
23 Each blade 30 forms a slit in the ground surface 4  
24 by traversing the ground surface 4, for example by  
25 being pulled by a tractor or the like through a  
26 linkage. As each blade 30 is pulled, it rotates  
27 about its axle 32, and so cuts through the ground  
28 surface 4.

29  
30 Feeding onto each blade 30 from the associated spool  
31 carrier 38 and through weave tensioners 46 is a  
32 folded woven polypropylene material 40 approximately

1 200mm wide, having a central woven band  
2 approximately 70-80mm wide, and free weft fibres  
3 extending from each side of the central band.  
4 Example dimensions are 65/70/65mm of free fibres and  
5 central core. The material 40 is shown  
6 diagrammatically in Figure 3, but is the same as  
7 that shown in Figures 1, 2a, 2b and Figure 7  
8 hereinafter.

9  
10 Fully woven polypropylene is used for forming bales  
11 or agricultural flexible sacks and the like.

12  
13  
14 The folding of the combined parts of the material  
15 20, 22 in Figures 2a and 2b is better seen in Figure  
16 4. The folding is arranged to fit over the edge of  
17 a blade 30 as hereinafter described.

18  
19 As the blades 30 rotate, the folded material 40  
20 follows the edge of the blade 30 and is therefore  
21 fed into the ground surface 4 as the blade 30 enters  
22 also. The force of the blade 30 then locates the  
23 folded central woven section 10 of the material 40  
24 in the slit formed, which part of the material 40  
25 then remains in the ground surface 4 whilst the edge  
26 of the blade 30 exits the ground surface 4. The  
27 free ends 48 of the material 40, like those 20 in  
28 Figures 2a and 2b, are however now visible whilst  
29 being securely retained in the ground surface 4 as  
30 the ground folds back around the remaining part of  
31 the material and holds it in place. Over time,  
32 roots and the like can grow through the part of the

1 material 22 in the ground surface 4, due to its open  
2 structure, increasing its securement in the ground.

3

4 Any ground disturbance caused by the slits is rolled  
5 by the rear roller 36.

6

7 In order to ensure straight lines, the apparatus or  
8 apparatus-pulling means, such as the tractor, could  
9 be laser guided by a laser set at the end of the  
10 intended path of the line, whose beam hits a  
11 receptor such as a screen on or near the apparatus  
12 etc. The screen is noted by the user in use, and  
13 the beam maintained within the screen, or limits set  
14 on the screen, to ensure the apparatus follows a  
15 straight line.

16

17 Figure 6 shows a process for forming a vented fabric  
18 material as used in Figures 2a and 2b, etc wherein  
19 lines of weft threads 52 are constantly run, whilst  
20 only intermittent lines of warp threads 50 are run  
21 thereinbetween; the line of production being towards  
22 arrow C.

23

24 Once cut along the dashed line 54, two pieces of  
25 vented fabric material 56 one of which is shown in  
26 Figure 7, is formed. Each piece 56 is useable for  
27 the method and with the apparatus hereinbefore  
28 described. That is, the extended or free weft  
29 threads 58 are the 'free fibres' 12, 48 shown in  
30 Figures 1, 2a 2b, 3 and 4, and the woven core 60 is  
31 the woven section 10, once the piece 56 is folded  
32 longitudinally in half.

1

2 The present invention has been found to lay the  
3 complete lines of the football pitch within a day,  
4 which lines then need no further maintenance or  
5 repair. Moreover, the free fibres 12,48 extending  
6 above the ground surface will not trip or catch any  
7 player, such as by his boots studs. Moreover, the  
8 free fibres 12, 48 cannot be cut by a lawnmower such  
9 that mowing any playing pitch is not a problem.

10

11 Even if the fibres 12, 48, over time, are no longer  
12 upstanding, they will generally maintain a visible  
13 area distinctive from the area therearound, such as  
14 grass. The fibres 12, 48 are also securely held in  
15 the ground surface 4, and cannot easily be pulled  
16 out as the fibres 12, 48 are only connected beneath  
17 the ground surface.

18

19 The present invention provides a simple but  
20 effective means of providing marked lines, which  
21 lines will remain, and need no further repair or  
22 maintenance for a number of years, while still  
23 providing the same visual effect as painted line.